

ABSTRACT

The present invention features a fluid flow regulator that functions to significantly influence fluid flow across the surface of an object, as well as to significantly effect the performance of the object subjected to the fluid. The fluid flow regulator comprises a pressure recovery drop that induces a sudden drop in pressure at an optimal pressure recovery point on said surface, such that a sub-atmospheric barrier is created that serves as a cushion between the molecules in the fluid and the molecules at the object's surface. More specifically, the present invention fluid flow regulator functions to significantly regulate the pressure gradients that exist along the surface of an object subject to fluid flow. Regulation of pressure gradients is accomplished by selectively reducing the pressure drag at various locations along the surface, as well as the pressure drag induced forward and aft of the object, via the pressure recovery drop. Reducing the pressure drag in turn increases pressure recovery or pressure recovery potential, which pressure recovery subsequently lowers the friction drag along the surface. By reducing or lowering friction drag, the potential for fluid separation is decreased, or in other words, attachment potential of the fluid is significantly increased. All of these effects may be appropriately and collectively phrased and referred to as optimization of fluid flow, wherein the fluid flow, its properties and characteristics (e.g., separation, boundary layer), and relationship to the object are each optimized. The present invention is specifically applicable to wings, wing-like structures (e.g. stabilizers and rudders), and diffusers.